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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/616,637	07/26/2000	Paul W. Dent	4015-424	9395

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EXAMINER
NGUYEN, LEE

ART UNIT	PAPER NUMBER
2682	9

DATE MAILED: 05/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/616,637	DENT, PAUL W.	
	Examiner	Art Unit	
	LEE NGUYEN	2682	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) *7-12,21-23 and 33-50* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,13,15-19 and 24-32* is/are rejected.

7)☒ Claim(s) *14, 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I in Paper No. 5 is acknowledged. The traversal is on the ground(s) that claims 36-50 do not describe a multiplexing invention that is separately usable from the antenna diversity invention described in claims 1-35. This is not found persuasive because claims 1 and 26 require polarization diversity and do not require multiplexing, while claims 36, 41, 47 and 50 require multiplexing and do not require polarization diversity. Applicant further stated that figures 7-8 and pages 21-24 of the present invention show that the antenna element in species I is not mutually exclusive. The examiner respectfully disagrees. The two claimed species are not related. One directs to antenna type, while the other directs to conversion with multiplexing.

The requirement is still deemed proper and is therefore made FINAL.

Information Disclosure Statement

2. The IDS filed 7/26/2000 and 5/31/2002 have been considered and recorded in the file.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-6, 13, 15-19, 24-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Dent (US 5,848,060) submitted by Applicant. Regarding claim 1, Dent teaches a communications satellite system for providing communications between a plurality of mobile terminals 420 (fig. 6) and a satellite ground station (Hub Station), said system comprising: at least one orbiting satellite 410 comprising a satellite dual-polarization receiving antenna (fig. 10, col. 12, lines 60-65), said satellite dual-polarization receiving antenna comprising multiple satellite antenna elements that receive first and second polarized signals from said plurality of mobile terminals (col. 12, lines 60-65), wherein said first polarized signals correspond to a first one of said dual polarizations and said second polarized signals correspond to a second one of said dual polarizations

(col. 12, line 64 through col. 13, line 2); a first transponder on board said satellite that processes said first polarized signals received from said mobile terminals to convert said first polarized signals to a first feeder link signal for transmission to said satellite ground station using a first feeder link polarization (col. 12, line 60 through col. 13, line 2); a second transponder on board said satellite that processes said second polarized signals received from said mobile terminals to convert said second polarized signals to a second feeder link signal for transmission to said satellite ground station using a second feeder link polarization col. 12, line 60 through col. 13, line 2); a ground-station dual-polarization receiving antenna at said satellite ground station that receives said first and second feeder link signals, said ground-station dual polarization receiving antenna comprising multiple ground-station antenna elements that receive said first and second feeder link signals from said satellite (col. 12, lines 28-30); a dual-channel receiver connected to said ground-station dual-polarization receiving antenna that amplifies, filters, downconverts, and digitizes the received first and second feeder link signals to produce numerical sample streams corresponding to said received first and second feeder link signals received at each of said multiple satellite antenna elements and each of

said dual-polarizations (fig. 9, 610-630, col. 10, lines 3-25); and a diversity demodulator connected to said dual channel receiver that combines said numerical samples streams to reproduce information transmitted by said plurality of mobile terminals (col. 10, lines 37-50).

Regarding claim 2, Dent also teaches that said satellite dual polarization receiving antenna is a Direct Radiating Array comprised of dual-polarization array elements (col. 12, lines 60-62).

Regarding claim 3, Dent also teaches that said satellite dual polarization receiving antenna comprises multiple dual-polarization antenna feed elements and a reflector (fig. 7, numeral 470).

Regarding claim 4, Dent also teaches that said multiple dual-polarization antenna feed elements are located out of the focal plane of said reflector (fig. 7, numeral 470).

Regarding claim 5, Dent also teaches that said multiple dual-polarization antenna feed elements are coupled using a Butler matrix (col. 9, lines 13-17).

Regarding claim 6, Dent further teaches that selected subgroups of said multiple dual polarization antenna feed elements are coupled using Butler matrices of reduced complexity (col. 9, lines 13-22).

Regarding claim 13, Dent also teaches that said diversity demodulator combines said numerical samples streams using beamforming controlled by a number of complex beamforming coefficients (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 15, Dent further teaches a beamformer and beamforming coefficients corresponding to each of said dual polarizations (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 16, Dent also teaches that said beamforming coefficients optimize demodulation of information from each of said plurality of mobile terminals independently (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 17, Dent further teaches comprising a separate demodulator for each signal simultaneously received on a given frequency channel from said plurality of mobile terminals that further combines outputs from said beamformers to decode information from one of said plurality of mobile terminals (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 18, Dent also teaches that said separate demodulator uses combining coefficients estimated with the aid of known symbols included in transmissions from said plurality of mobile terminals (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 19, Dent further teaches that said beamforming coefficients are fixed and correspond to optimizing reception from a set of fixed directions (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 24, Dent also teaches that said diversity demodulator is adapted to perform digital channel splitting to separate each of said numerical sample streams into numerical sample streams of reduced sample rate, each numerical sample stream of reduced rate corresponding to one of a number of frequency channels (fig. 9, numeral 650, col. 10, lines 38-55).

Regarding claim 25, Dent also teaches that said diversity demodulator further is adapted to perform digital beamforming for each of said frequency channels to combine ones of said numerical sample streams of reduced sample rate corresponding to the same frequency channel (fig. 9, numeral 650, col. 10, lines 38-55).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohlson et al. (US 5,533,023) in view of Runyon (US 5,966,102) and Dent (US 5,848,060) submitted by Applicant.

Regarding claim 26, Ohlson teaches a communications satellite system for providing communications between a plurality of mobile terminals and a satellite ground station, said system comprising: at least two orbiting satellites (col. 3, line 4), satellite comprising a receiving antenna for receiving signals from a plurality of mobile terminals 10 (fig. 1); at least one ground station GS comprising at least two receiving antennas 11 each said receiving antenna being orientated toward a corresponding one of said at least two satellites 5 to receive transponded signals transmitted from said corresponding satellite to said ground station; a diversity receiver at said at least one ground station for jointly processing transponded signals transmitted from said at least two satellites and received by said at least two receiving antennas to decode information transmitted by said mobile communications terminals (col. 3, lines 3-16 and col. 4, lines 19-20). Ohlson fails to teach that each satellite comprises a multi-element, dual-polarization receiving antenna comprising multiple satellite antenna

elements that receive signals from said plurality of mobile terminals. Runyon teaches that each satellite comprises a multi-element, dual-polarization receiving antenna comprising multiple satellite antenna elements that receive signals from said plurality of mobile terminals (col. 2, lines 25-41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Runyon to the system of Ohlson in order to enhance effectiveness of received signals. Ohlson as modified fails to teach that each of said satellites has a dual-channel transponder that transponds signals received by each of said multiple satellite antenna elements so as to preserve relative phase and amplitude between signals from different satellite antenna elements of the same satellite. Dent teaches that each of said satellites has a dual-channel transponder that transponds signals received by each of said multiple satellite antenna elements so as to preserve relative phase and amplitude between signals from different satellite antenna elements of the same satellite (col. 8, lines 34-37). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Dent to the system of Ohlson in order to preserve the phase relationships at the downconverted frequencies.

Regarding claim 27, Ohlson as modified also teaches that said multi-element satellite antennas for each of said orbiting satellites are Direct Radiating Arrays comprised of dual-polarization array elements (col. 2, lines 30-41 of Runyon).

Regarding claim 28, Ohlson as modified also teaches that said multi-element satellite antennas for each of said orbiting satellites comprise multiple dual-polarization antenna feed elements and a reflector (col. 2, lines 30-41 of Runyon).

Regarding claim 29, Ohlson as modified also teaches that respective ones of said multiple dual-polarization antenna feed elements are located out of the focal plane of said reflector (col. 2, lines 30-41 of Runyon).

Regarding claims 30-31, Ohlson as modified also teaches that respective ones of said multiple dual-polarization antenna feed elements are coupled using a Butler matrix and that selected subgroups of each of said multiple dual polarization antenna feed elements are coupled using Butler matrices of reduced complexity (col. 9, lines 13-22 of Dent).

Regarding claim 32, Ohlson as modified also teaches that each of said dual channel transponders uses quadrature time division multiplexing to preserve relative phase and amplitude between signals from different

satellite antenna elements of the same satellite (col. 13, lines 14-26 of Dent).

Allowable Subject Matter

7. Claims 14, 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Regarding claim 14, the prior art of record fails to teach that the number of said beamforming coefficients used at any instant is equal to the product of the number of said numerical sample streams times the number of signals from said plurality of mobile terminals received on the same frequency channel at said at least one orbiting satellite at said any instant. Regarding claim 20, the prior art of record fails to teach that said beamforming coefficients are fixed and correspond to optimizing reception from a number of fixed directions, and said plurality of mobile terminals are allocated to use a set of said beamforming coefficients corresponding to optimum reception from the direction in which each of said plurality of mobile terminals location most closely corresponds.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEE NGUYEN whose telephone number is (703)-308-5249. The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, VIVIAN CHIN can be reached on (703) 308-6739. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

LEE NGUYEN Lee 4/27/03
Primary Examiner
Art Unit 2682